



**TO:** CHARLIE HOLLINGWORTH  
**ROLE:** ENVIRONMENTAL SUPERVISOR  
**COMPANY:** CARGILL BEEF AUSTRALIA, WAGGA WAGGA  
**FROM:** TERRY SCHULZ & ANDREW CANTLAY  
**DATE:** 21 APRIL 2010  
**JOB NO:** N1569L  
**SUBJECT:** PLANT WIDE ODOUR IMPACT ASSESSMENT

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## INTRODUCTION

At the request of Cargill Beef Australia Pty Limited (CBA) TOU carried out an odour impact assessment to support the Statement of Environmental Effects (SEE) that has been lodged with the Department of Planning (DoP). This odour assessment is required by the DoP to show that the current odour levels and the odour levels of the proposed Effluent System Upgrade (ESU), at the CBA Wagga Wagga plant, will not result in offensive odours offsite.

This odour assessment has been carried out in accordance with the *Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW (DECCW)* and *Technical Notes: Assessment and Management of Odour from Stationary Sources in NSW (DECCW)*.

The odour assessment has used data from odour sampling surveys conducted by The Odour Unit Pty Limited (TOU) for the Rendering Plant and Lairage emissions, in addition to data from TOUs odour emission database for the proposed new wastewater treatment system.

The following Memorandum briefly outlines the modelling methodology and summarizes the results and overall findings of the odour assessment.

## **METHODOLOGY**

The methodology employed for this odour assessment is the same as that used previously within the report *Odour Impact Assessment Study- required by Development Consent DA 220-07-2002-i, Conditions 5.5, 6.1 6.2 and 6.3. - Final Report 2007 (TOU)*.

### Current Odour Sources

The main odour sources currently at the Wagga Wagga plant include the Biofilter, Rendering Plant the Cattle Lairage and the Wastewater Ponds. The existing ponds will be largely replaced by a new covered anaerobic lagoon and the new Biolac BNR plant.

The biofilter treats the odour captured from the rendering plant in four separate cells and as such the biofilter is treated as four individual point sources in the model. Data was last collected for the biofilter on 20/04/2010 (**Appendix A**) where representative odour samples were collected from each biofilter cell using the standard drum and pump method drawing the treated air from beneath a plastic tarpaulin. The odour concentration of each cell was then used in conjunction with the respective air flowrate data collected to determine an odour emission rate for each biofilter cell. These odour emission rates were then used within the odour model.

The rendering plant odour control system was designed by TOU. The design features the point-source capture of odorous processing emissions and treatment in the biofilter. Any residual odour in the building ventilation air is vented to the atmosphere through three roof vents. Provided that doors and other openings are closed, the building functions under negative pressure. The fugitive emissions have therefore been assumed to be negligible and not modelled within this study. The rendering plant vents were last sampled on 24/07/2010 and those calculated odour emission rates were modelled in this odour study.

The previous odour emission rate for the cattle lairage area has been used in this modelling study as operations have not changed since the previous modelling was carried out.

## Proposed Effluent System Upgrade (ESU) Odour Sources

Odour emissions from irrigation are expected to be negligible, due the high quality of the treated effluent that is mostly directly to the sewer, and as such have not been modelled within this study.

The odour emissions from the flaring of gases, produced by the anaerobic ponds, are likely to be negligible as it is widely accepted that the flaring will result in complete combustion of the odorous compounds in the biogas. The flared gas odour emissions have therefore not been modelled within this study.

Waste sludge from the Biological Nutrient Removal (BNR) system will be sent directly to a dewatering device (belt filter press) and then loaded off site within 1-2 days, without utilising the sludge drying beds. Similarly, excess sludge from the anaerobic ponds (removed 6 monthly or yearly) will be pumped (directly or via suck truck) to the same dewatering device and follow the same process. Following the ESU, the drying beds will only be maintained as a contingency in the event of a failure of another system. The odour emissions for sludge removal have therefore not been modelled within this study.

The odour sources from the biological treatment system upgrade will consist of the BNR extended aeration basin and an effluent equalization pond. The BNR system will consist of both anoxic and aerobic zone based on the Biolac design. Based on available information TOU have assigned odour emission rates (OERs) for the ESU from TOUs odour emission database for wastewater treatment plants (WWTP).

## Odour Emissions Inventory

The **Table 1.1** below summarizes the odour emission rates assigned for this odour assessment study. The AUSPLUME dispersion model input configuration data, within **Appendix B**, provides a more comprehensive set of data.

Due to the design of the proposed biological treatment upgrade at the Wagga Wagga plant, the BNR was modelled as two sources to reflect the BNR's combination of anoxic and aerobic zones.

TOUs national WWTP odour emissions database was used to examine all BNR anoxic zone emission rates, all BNR aerobic zone emission rates and all Equalisation Basin emission rates. Each set of data was then analysed separately to determine the 50<sup>th</sup> percentile (average) specific odour emission rates (SOERs). The 50<sup>th</sup> percentile emissions were selected as conservative emission rates for the proposed ESU at Wagga Wagga, in the expectation that the long sludge age, extended aeration nature of the treatment process in the Biolac system is likely to be less odorous than the bulk of the WWTPs upon which the database is based.

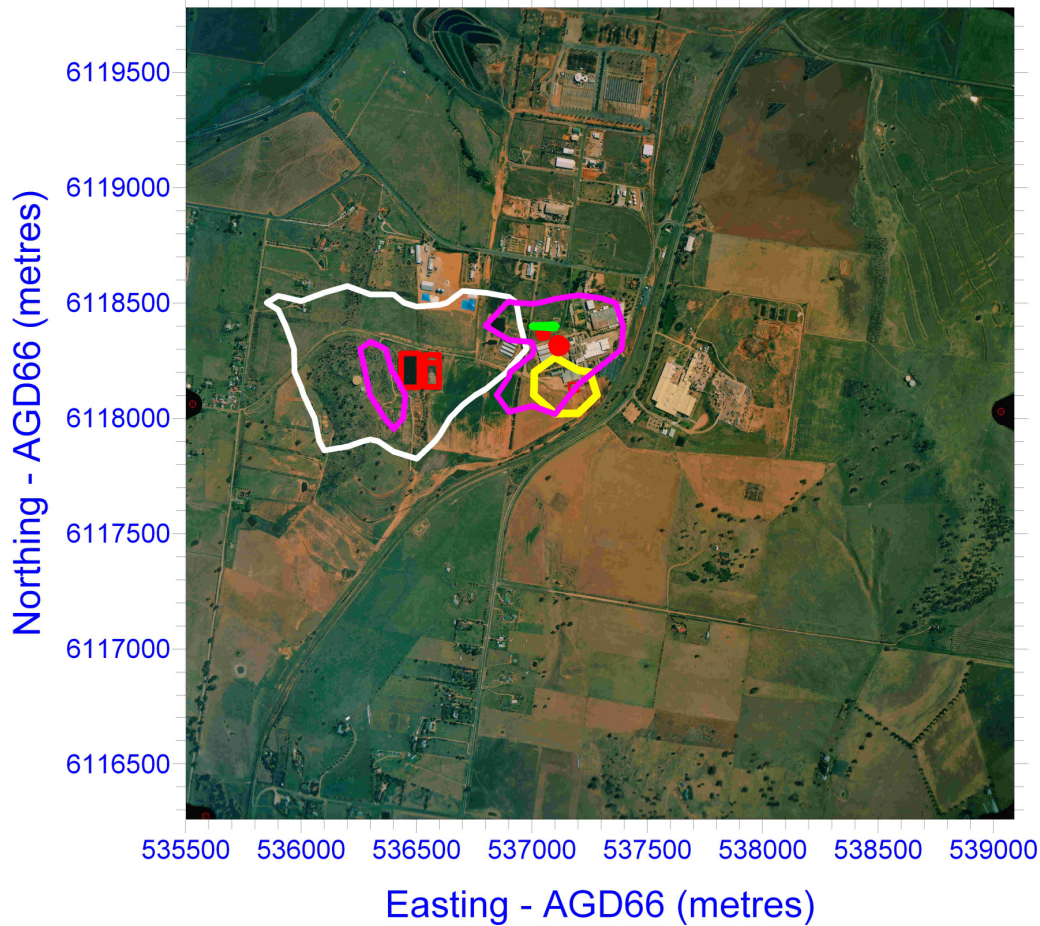
**Table 1.1: Cargill Wagga Wagga Odour Emission Rates**


Odour Source	Odour Concentration (ou)	Stack Source / Volume OER	Area Source SOER
Rendering plant roof vent 1	609	8,648	
Rendering plant roof vent 2	362	5,140	
Rendering plant roof vent 3	790	11,218	
Biofilter Cell 1 (North)	215 (Mean concentration)	512	
Biofilter Cell 2 (East)		512	
Biofilter Cell 3 (South)		512	
Biofilter Cell 4 (West)		512	
BNR 1 (Aerobic)			0.170
BNR 2 (Anoxic)			0.120
Equalisation Pond/Effluent Dam			1.000
Cattle Lairage- Dirty/soiled			Variable
Cattle Lairage- Clean			Variable

## RESULTS

The modelling plot shown in **Figure 1.1** illustrates the projected ground level odour concentrations from the Cargill Wagga Wagga plant. Because each of these four odours has a noticeably different odour character, each modelled odour source has been modelled separately and then overlayed on the same aerial photo to illustrate the individual odour impact of each odour source.

## Cargill Wagga\_All Sources\_2010

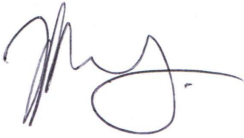


<b>DESCRIPTION</b>  <b>NSW DECCW OPC</b> 4 ou ground level odour concentration, 99.0th percentile, 1-second averaging.		<b>LEGEND</b>  <span style="color: yellow;">—</span> Cattle Lairage <span style="color: white;">—</span> Wastewater Sources <span style="color: magenta;">—</span> Rendering Plant <span style="color: green;">—</span> Biofilter <span style="color: red;">—</span> Odour Sources		<b>CLIENT/PROJECT</b>  Cargill Wagga Wagga- Odour Assessment	
	THE ODOUR UNIT PTY LTD Suite 16012, Locomotive Workshop, Australian Technology Park, 2 Locomotive Street, Eveleigh, NSW, 2015 Phone: (02) 9209 4420 – Fax: (02) 9209 4421	<b>MODELLED BY</b> A CANTLAY 21.04.2010	<b>TITLE</b>  Cargill Wagga Wagga	<b>DRAWING No.</b> Figure 1.1	
		<b>CHECKED</b> S HAYES 21.04.2010		<b>JOB No.</b> N1569L	
		<b>APPROVED</b> T SCHULZ 21.04.2010			

**Figure 1.1:** Projected ground level odour concentrations from the Wagga Wagga plant.

## DISCUSSION

It is clear from the results of the modelling that none of the four odour sources at the plant is likely to result in adverse odour impacts, at the odour emission rates modelled. The rates for the rendering plant emissions (roof fans and biofilter) reflect the good performance of the odour control system measured in July 2009 (fans) and April 2010 (biofilter). While the emissions from the proposed ESU produce the largest odour 'footprint', the 4 ou contour falls outside the nearest sensitive residential receptor. Significantly, the odour character expected from the ESU is the 'earthy/musty' odour character typical of extended aeration treatment processes. This type of odour is most unlikely to cause odour nuisance, even at concentrations greater than 4 ou. It will differ greatly from the typical anaerobic lagoon odour emitted from the existing wastewater system.



Terry Schulz  
Managing Director  
23 April 2010



Andrew Cantlay  
Consultant  
23 April 2010



## Appendix A: Odour Concentration Results Sheets

# THE ODOUR UNIT PTY LTD



THE ODOUR  
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Accreditation Number:  
14974

## Form 06 - Sydney Laboratory Odour Concentration Measurement Results

**This Document is Issued in Accordance with NATA's Accreditation Requirements**

The measurement was commissioned by:

Organisation	Cargill Beef Australia	Telephone	(02) 6938-3219
Contact	C. Hollingworth	Facsimile	(02) 6931-7236
Sampling Site	Wagga Wagga Facility	Email	Charles_Hollingworth@cargill.com
Sampling Method	Drum + pump	Sampling Team	TOU

Order details:

Order requested by	C. Hollingworth	Order accepted by	T. Schulz
Date of order	13/04/2010	TOU Project #	N1568L
Order number	Refer to correspondence	Project Manager	T. Schulz
Signed by	Refer to correspondence	Testing operator	A. Schulz

Investigated Item	Odour concentration in odour units 'ou', determined by sensory odour concentration measurements, of an odour sample supplied in a sampling bag.
Identification	The odour sample bags were labelled individually. Each label recorded the testing laboratory, sample number, sampling location (or Identification), sampling date and time, dilution ratio (if dilution was used) and whether further chemical analysis was required.
Method	The odour concentration measurements were performed using dynamic olfactometry according to the Australian Standard 'Determination of Odour Concentration by Dynamic Olfactometry AS/NZS4323.3:2001. The odour perception characteristics of the panel within the presentation series for the samples were analogous to that for butanol calibration. Any deviation from the Australian standard is recorded in the 'Comments' section of this report.
Measuring Range	The measuring range of the olfactometer is $2^2 \leq \chi \leq 2^{18}$ ou. If the measuring range was insufficient the odour samples will have been pre-diluted. The machine is not calibrated beyond dilution setting $2^{17}$ . This is specifically mentioned with the results.
Environment	The measurements were performed in an air- and odour-conditioned room. The room temperature is maintained between 22°C and 25°C.
Measuring Dates	The date of each measurement is specified with the results.
Instrument Used	The olfactometer used during this testing session was: ODORMAT SERIES V05
Instrumental Precision	The precision of this instrument (expressed as repeatability) for a sensory calibration must be $r \leq 0.477$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $r = 0.1366$ (23/24 July, 2009) Compliance – Yes
Instrumental Accuracy	The accuracy of this instrument for a sensory calibration must be $A \leq 0.217$ in accordance with the Australian Standard AS/NZS4323.3:2001. ODORMAT SERIES V05: $A = 0.1840$ (23/24, July 2009) Compliance – Yes
Lower Detection Limit (LDL)	The LDL for the olfactometer has been determined to be 16 ou (4 times the lowest dilution setting)
Traceability	The measurements have been performed using standards for which the traceability to the national standard has been demonstrated. The assessors are individually selected to comply with fixed criteria and are monitored in time to keep within the limits of the standard. The results from the assessors are traceable to primary standards of n-butanol in nitrogen.

Date: Thursday, 22 April 2010

Panel Roster Number: SYD20100421\_036

**T. Schulz**  
Managing Director

**A. Cantlay**  
Authorised Signatory

The Odour Unit Pty Ltd  
ACN 091 165 061

Form 06 – Odour Concentration Results Sheet (V02)

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## Odour Sample Measurement Results Panel Roster Number: SYD20100421\_036

Sample Location	TOU Sample ID	Sampling Date & Time	Analysis Date & Time	Panel Size	Valid ITEs	Nominal Sample Dilution	Actual Sample Dilution (Adjusted for Temperature)	Sample Odour Concentration (as received, in the bag) (ou)	Sample Odour Concentration (Final, allowing for dilution) (ou)	Specific Odour Emission Rate (ou.m <sup>3</sup> /m <sup>2</sup> /s)
Composite biofilter across cell 2/2 beds	SC10273	20/04/2010 1155hrs	21/04/2010 0946hrs	5	10	-	-	274	274	N/A
Composite biofilter across cell 1/2 beds	SC10274	20/04/2010 1205hrs	21/04/2010 1019hrs	5	10	-	-	169	169	N/A
Biofilter Inlet to cell 2	SC10275	20/04/2010 1215hrs	21/04/2010 1054hrs	5	10	-	-	5043	5043	N/A



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## Odour Panel Calibration Results

Reference Odorant	Reference Odorant Panel Roster Number	Concentration of Reference gas (ppb)	Panel Target Range for n-butanol (ppb)	Measured Concentration (ou)	Measured Panel Threshold (ppb)	Does this panel calibration measurement comply with AS/NZS4323.3:2001 (Yes / No)
n-butanol	SYD20100421_036	49,900	$20 \leq \chi \leq 80$	832	60	Yes

Comments None.

Disclaimer Parties, other than TOU, responsible for collecting odour samples hereby certify that they have voluntarily furnished these odour samples, appropriately collected and labelled, to The Odour Unit Pty Limited for the purpose of odour testing. The collection of odour samples by parties other than The Odour Unit Pty Limited relinquishes The Odour Unit Pty Limited from all responsibility for the sample collection and any effects or actions that the results from the test(s) may have.

Note This report shall not be reproduced, except in full, without written approval of The Odour Unit Pty Limited.

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## **Appendix B: AUSPLUME Dispersion Model Input Configuration Data**

### Appendix B: Ausplume Dispersion Model Input Configuration Data - Wagga Wagga Plant

Source Type	Odour Source		X Coordinate (AMG)	Y Coordinate (AMG)	X Coordinate (MGA)	Y Coordinate (MGA)	Z Coordinate	Stack Source				Area Source						OERs, SOERs, Peak-to-Mean Factors					
								Emission Release Height (m)	Diameter (m)	Temp (°C)	Exit Velocity (m/s)	Source Height (m)	Source Shape	Initial Vertical Spread (m)	X Side Length (m)	Y Side Length (m)	Angle (degrees)	Radius (m)	Stack Source / Volume OER	Area Source SOER	Wake Affected Stack / Volume Source: PM60 Factor A-F 2.3	Area Source: PM60 Factor A-D 2.5	Area Source: PM60 Factor E-F 2.3
Stack / Point	Rendering plant roof vent 1	RPrv1	537122	6118312	N/A	N/A	220	9	1.37	33	9.66							8,648		19,890			
	Rendering plant roof vent 2	RPrv2	537114	6118310	N/A	N/A	220	9	1.37	33	9.66							5,140		11,822			
	Rendering plant roof vent 3	RPrv3	537112	6118318	N/A	N/A	220	9	1.37	33	9.66							11,218		25,801			
	Biofilter Cell 1 (North)	BioC1	537051	6118372	N/A	N/A	220	2	9.18	38	0.036							512		1,178			
	Biofilter Cell 2 (East)	BioC2	537056	6118362	N/A	N/A	220	2	9.18	38	0.036							512		1,178			
	Biofilter Cell 3 (South)	BioC3	537044	6118359	N/A	N/A	220	2	9.18	38	0.036							512		1,178			
	Biofilter Cell 4 (West)	BioC4	537040	6118368	N/A	N/A	220	2	9.18	38	0.036							512		1,178			
Area	BNR 1	BNR1	536537	6118135	N/A	N/A	230					0	Rectangular	1	61	104	0	N/A		0.170		0.425	0.391
	BNR 2	BNR2	536537	6118239	N/A	N/A	230					0	Rectangular	1	61	35	0	N/A		1.120		2.800	2.576
	Equalisation Pond/Effluent Dam	EQLPND	536433	6118281	N/A	N/A	230					0	Rectangular	1	80	147	0	N/A		1.000		2.500	2.300
	Cattle Lairage	CLrg	537164	6118109	N/A	N/A	220					0	Rectangular	1	40	40	-10	N/A		Variable		N/A	N/A